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CLAIMS

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[Claim(s)]

[Claim 1] It consists of the 2nd liquid crystal display panel which displays the 1st liquid crystal display panel and virtual image which display the real image mutually arranged considering a half mirror and this half mirror as a core in the location of an abbreviation right angle. It is the liquid crystal display characterized by having been the liquid crystal display for three dimensional displays which performs the three dimensional display of a request configuration, and having arranged said half mirror side so that it may see from an observer side and may incline caudad, and having arranged said 2nd liquid crystal display panel to the lower part side of the half mirror side.

[Claim 2] It consists of the 2nd liquid crystal display panel which displays the 1st liquid crystal display panel and virtual image which display the real image mutually arranged considering a half mirror and this half mirror as a core in the location of an abbreviation right angle. While it is the liquid crystal display for three dimensional displays which performs the three dimensional display of a request configuration, said half mirror side is arranged so that it may see from an observer side and may incline caudad, and arranging said 2nd liquid crystal display panel to the lower part side of the half mirror side. The liquid crystal display characterized by changing the distance from said 1st and 2nd liquid crystal display panels to a half mirror.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the liquid crystal display in which a three dimensional display is possible especially about a liquid crystal display.

[0002]

[Description of the Prior Art] Reference of drawing 5 constitutes the liquid crystal display of the conventional three dimensional display from the light source (13) of the 1st [ which carried out right-angle arrangement of a half mirror (10) and this half mirror (10) as a core ], 2nd liquid crystal display panel (11), (12) and the 1st, and 2nd liquid crystal display panels (11), and (12), (14), and a mirror (15) and (16).

[0003] The 1st and 2nd 1st liquid crystal display panels (11) and (12) arrange the common electrode substrate and segment electrode substrate which formed the common electrode and the segment electrode by ITO etc. at intervals of 10 micrometers of abbreviation so that an electrode may counter, and they are filled up with liquid crystal in this substrate gap. The background of an image to display predetermined is patternized by the segment electrode of this 1st liquid crystal display panel (11), the selection transparency of the light of the light source (12) is carried out, and a predetermined image is displayed. Moreover, the image to display predetermined is patternized by the segment electrode of the 2nd liquid crystal display panel (12), the selection transparency of the light of the light source (14) is carried out, and a predetermined image is displayed. By turning on and off these display panels (11) and (12) by turns, the below-mentioned three dimensional display becomes possible.

[0004] From the distance from the 1st liquid crystal display panel (11) to a half mirror (1), only I is set up short and, as for the distance from this 2nd liquid crystal display panel (12) to a half mirror (10), the image of the 2nd liquid crystal display panel (12) is observed by the observer at the B point ahead of [ I ] the 1st liquid crystal display panel (11). In the above-mentioned conventional liquid crystal display by which a configuration is carried out, since the field angles of the image of the 1st liquid crystal display panel (11) of a B point and the image of the 2nd liquid crystal display panel (12) differ slightly when the observer is approaching the liquid crystal display concerned, the image of the 1st and 2nd liquid crystal display panels (11) and (12) is recognized in three dimensions.

[0005]

[Problem(s) to be Solved by the Invention] Since the distance from the 1st liquid crystal display panel (11) and the 2nd liquid crystal display panel (12) to a half mirror (1) is changed in the above-mentioned conventional liquid crystal display, In an observer approaching this liquid crystal display, as mentioned above etc., the field angles of the image which carries out incidence to the eye of those right and left differ slightly, and the image of the 1st and 2nd liquid crystal display panels (11) and (12) may be recognized in three dimensions. However, when an above-mentioned display is observed in anticipated-use distance, since the above-mentioned field angle becomes equal to abbreviation zero, it has the fault to which the three dimensional display effectiveness becomes low.

[0006] Moreover, in the conventional liquid crystal display, since it was the structure where a half

mirror (10) side saw from an observer side, and was arranged up, it has the fault in which the light source of indoor lighting etc. reflects in a half mirror (10), and is in sight of an observer, and display grace is reduced. It is in offering the liquid crystal display for three dimensional displays which this invention was made in view of the technical problem mentioned above, and the purpose of this invention made the three dimensional display possible in anticipated-use distance, i.e., practical use distance, and was excellent in display grace.

[0007]

[Means for Solving the Problem] In order to solve the technical problem mentioned above and to attain the purpose, the liquid crystal display concerning this invention It consists of the 2nd liquid crystal display panel which displays the 1st liquid crystal display panel and virtual image which display the real image mutually arranged considering a half mirror and this half mirror as a core in the location of an abbreviation right angle. It is the liquid crystal display for three dimensional displays which performs the three dimensional display of a request configuration, and is characterized by having arranged said half mirror side so that it may see from an observer side and may incline caudad, and having arranged said 2nd liquid crystal display panel to the lower part side of the half mirror side.

[0008] Moreover, the liquid crystal display concerning this invention consists of the 2nd liquid crystal display panel which displays the 1st liquid crystal display panel and virtual image which display the real image mutually arranged considering a half mirror and this half mirror as a core in the location of an abbreviation right angle. While it is the liquid crystal display for three dimensional displays which performs the three dimensional display of a request configuration, said half mirror side is arranged so that it may see from an observer side and may incline caudad, and arranging said 2nd liquid crystal display panel to the lower part side of the half mirror side It is characterized by changing the distance from said 1st and 2nd liquid crystal display panels to a half mirror.

[0009]

[Function] In the liquid crystal display constituted as mentioned above, since the panel flat surface of the 1st and 2nd liquid crystal display panels has been arranged at the non-right angle, in order that those images may carry out incidence to an observer with a comparatively big field angle difference, in view of a distant place, the distance of two images is recognized clearly and the three dimensional display effectiveness improves.

[0010] Moreover, since the half mirror side is arranged caudad, in view of the observer side, and the indoor light source does not reflect in a half mirror, display grace can be raised.

[0011]

[Example] Below, this invention is explained based on the example shown in drawing 1 thru/or drawing 4 . The liquid crystal display of this invention consists of the light source (4) of the 1st [ which has been arranged at the abbreviation right angle centering on a half mirror (1) and this half mirror (1) ], and 2nd liquid crystal display panels (2), (3), and the 1st and 2nd liquid crystal display panels (2) and (3), (5), and a mirror (6) and (7) like drawing 1 .

[0012] The 1st and 2nd liquid crystal display panels (2) and (3) are the things of the configuration of the common knowledge which has arranged the common electrode substrate and segment electrode substrate which formed the common electrode and the segment electrode by ITO etc. at intervals of 10 micrometers of abbreviation so that each electrode may counter, and was filled up with liquid crystal in this substrate gap. By the way, while a half mirror (1) is arranged so that the mirror side may see from an observer and may serve as a lower part, the 2nd liquid crystal display panel (3) which displays a virtual image on the lower part side of the half mirror (1) side is arranged. And the 1st liquid crystal display panel (2) is arranged in the inner part of the half mirror (1).

[0013] The image to display as shown in drawing 2 is patternized, and the 1st liquid crystal display panel (2) carries out the selection transparency of the light of the light source (4), and displays the image (for example, 8 character segments) of drawing 2 . This image is looked at by the observer as a real image in the case of a three dimensional display. And as for the panel flat surface of this 1st liquid crystal display panel (2), only theta 1 inclines to the shaft L of drawing. For this reason, the image of the 1st liquid crystal display panel (2) is transmitted leftward [ drawing ] with an optical axis L1 through a

half mirror (1), and carries out incidence to an observer's eyes in the viewing angle  $\theta_1$ .

[0014] On the other hand, the image to display as shown in drawing 3 is patternized, and the 2nd liquid crystal display panel (3) carries out the selection transparency of the light of the light source (5), and displays the image of drawing 3. And as for the panel flat surface of this 2nd liquid crystal display panel (3), only  $\theta_2$  inclines to the shaft L of drawing. For this reason, it reflects by the half mirror (1), and the 2nd liquid crystal display panel (3) is transmitted leftward [ drawing ] with an optical axis L2, and carries out incidence of the image to an observer's eyes in the viewing angle  $\theta_2$ . This image overlaps the real image mentioned above as a virtual image of a three dimensional display, and a desired three dimensional display is performed.

[0015] Moreover, from the distance from the 1st liquid crystal display panel (2) to a half mirror (1), only I is set up short and, as for the distance from this 2nd liquid crystal display panel (3) to a half mirror (1), the image (namely, virtual image) of the 2nd liquid crystal display panel (3) is observed by the observer near the A point ahead of [ I ] the 1st liquid crystal display panel (2). In addition, it is [ the 1st and 2nd liquid crystal display panels (2) and (3) ] usable also to display panels, such as a dot-matrix method. Here, the example using the liquid crystal display panel in which the segment electrode of an INTADIJITARU configuration was formed was explained.

[0016] In order to carry out incidence to an observer's eyes  $\theta_1$ - $\theta_2$  in the location before and behind that regardless of the image (virtual image) of the 2nd liquid crystal display panel (3) in an A point, and the image (real image) of the 1st liquid crystal display panel (2) in the liquid crystal display of above-mentioned this invention by which a configuration is carried out, Since the distance to a half mirror (1) was changed, respectively from the 1st liquid crystal display panel (2) and the 2nd liquid crystal display panel (3) while each image distinguished and was recognized, Depth perception strong against the image (real image) of the 1st liquid crystal display panel (2) and the image (virtual image) of the 2nd liquid crystal display panel (3) will be given, and as shown in drawing 4, it will be displayed in three dimensions.

[0017] Moreover, since an indoor fluorescence LGT does not reflect in a half mirror (1) even if it performs a three dimensional display, since it has been arranged so that a half mirror (1) side may see from an observer and may serve as a lower part, and the 2nd liquid crystal display panel (3) is arranged to the lower part side, three dimensional display grace can be raised. Although the example mentioned above explained the example which makes the both sides of the 1st liquid crystal display panel (2) and the 2nd liquid crystal display panel (3) incline, by this invention, by making one of liquid crystal display panels incline does not need to explain that the desired end can be attained.

[0018]

[Effect of the Invention] As stated above, by this invention, those images will carry out incidence to an observer with a big field angle difference as compared with the case where the location of those images is only changed since non-right-angle arrangement of the panel flat surface of the 1st and 2nd liquid crystal display panels was carried out, the distance of two images is clearly recognized even from a distant place, and the three dimensional display effectiveness improves.

[0019] Moreover, in this invention, by arranging a half mirror side caudad from the viewpoint of an observer, and arranging the 2nd liquid crystal display panel at this lower part side, since illumination light, such as an indoor fluorescence LGT, does not reflect in a half mirror, three dimensional display grace can be raised.

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TECHNICAL FIELD

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[Industrial Application] This invention relates to the liquid crystal display in which a three dimensional display is possible especially about a liquid crystal display.

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PRIOR ART

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[Description of the Prior Art] Reference of drawing 5 constitutes the liquid crystal display of the conventional three dimensional display from the light source (13) of the 1st [ which carried out right-angle arrangement of a half mirror (10) and this half mirror (10) as a core ], 2nd liquid crystal display panel (11), (12) and the 1st, and 2nd liquid crystal display panels (11), and (12), (14), and a mirror (15) and (16).

[0003] The 1st and 2nd 1st liquid crystal display panels (11) and (12) arrange the common electrode substrate and segment electrode substrate which formed the common electrode and the segment electrode by ITO etc. at intervals of 10 micrometers of abbreviation so that an electrode may counter, and they are filled up with liquid crystal in this substrate gap. The background of an image to display predetermined is patternized by the segment electrode of this 1st liquid crystal display panel (11), the selection transparency of the light of the light source (12) is carried out, and a predetermined image is displayed. Moreover, the image to display predetermined is patternized by the segment electrode of the 2nd liquid crystal display panel (12), the selection transparency of the light of the light source (14) is carried out, and a predetermined image is displayed. By turning on and off these display panels (11) and (12) by turns, the below-mentioned three dimensional display becomes possible.

[0004] From the distance from the 1st liquid crystal display panel (11) to a half mirror (1), only I is set up short and, as for the distance from this 2nd liquid crystal display panel (12) to a half mirror (10), the image of the 2nd liquid crystal display panel (12) is observed by the observer at the B point ahead of [ I ] the 1st liquid crystal display panel (11). In the above-mentioned conventional liquid crystal display by which a configuration is carried out, since the field angles of the image of the 1st liquid crystal display panel (11) of a B point and the image of the 2nd liquid crystal display panel (12) differ slightly when the observer is approaching the liquid crystal display concerned, the image of the 1st and 2nd liquid crystal display panels (11) and (12) is recognized in three dimensions.

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EFFECT OF THE INVENTION

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[Effect of the Invention] As stated above, by this invention, those images will carry out incidence to an observer with a big field angle difference as compared with the case where the location of those images is only changed since non-right-angle arrangement of the panel flat surface of the 1st and 2nd liquid crystal display panels was carried out, the distance of two images is clearly recognized even from a distant place, and the three dimensional display effectiveness improves.

[0019] Moreover, in this invention, by arranging a half mirror side caudad from the viewpoint of an observer, and arranging the 2nd liquid crystal display panel at this lower part side, since illumination light, such as an indoor fluorescence LGT, does not reflect in a half mirror, three dimensional display grace can be raised.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] Since the distance from the 1st liquid crystal display panel (11) and the 2nd liquid crystal display panel (12) to a half mirror (1) is changed in the above-mentioned conventional liquid crystal display, In an observer approaching this liquid crystal display, as mentioned above etc., the field angles of the image which carries out incidence to the eye of those right and left differ slightly, and the image of the 1st and 2nd liquid crystal display panels (11) and (12) may be recognized in three dimensions. However, when an above-mentioned display is observed in anticipated-use distance, since the above-mentioned field angle becomes equal to abbreviation zero, it has the fault to which the three dimensional display effectiveness becomes low.

[0006] Moreover, in the conventional liquid crystal display, since it was the structure where a half mirror (10) side saw from an observer side, and was arranged up, it has the fault in which the light source of indoor lighting etc. reflects in a half mirror (10), and is in sight of an observer, and display grace is reduced. It is in offering the liquid crystal display for three dimensional displays which this invention was made in view of the technical problem mentioned above, and the purpose of this invention made the three dimensional display possible in anticipated-use distance, i.e., practical use distance, and was excellent in display grace.

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MEANS

[Means for Solving the Problem] In order to solve the technical problem mentioned above and to attain the purpose, the liquid crystal display concerning this invention It consists of the 2nd liquid crystal display panel which displays the 1st liquid crystal display panel and virtual image which display the real image mutually arranged considering a half mirror and this half mirror as a core in the location of an abbreviation right angle. It is the liquid crystal display for three dimensional displays which performs the three dimensional display of a request configuration, and is characterized by having arranged said half mirror side so that it may see from an observer side and may incline caudad, and having arranged said 2nd liquid crystal display panel to the lower part side of the half mirror side.

[0008] Moreover, the liquid crystal display concerning this invention consists of the 2nd liquid crystal display panel which displays the 1st liquid crystal display panel and virtual image which display the real image mutually arranged considering a half mirror and this half mirror as a core in the location of an abbreviation right angle. While it is the liquid crystal display for three dimensional displays which performs the three dimensional display of a request configuration, said half mirror side is arranged so that it may see from an observer side and may incline caudad, and arranging said 2nd liquid crystal display panel to the lower part side of the half mirror side It is characterized by changing the distance from said 1st and 2nd liquid crystal display panels to a half mirror.

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OPERATION

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[Function] In the liquid crystal display constituted as mentioned above, since the panel flat surface of the 1st and 2nd liquid crystal display panels has been arranged at the non-right angle, in order that those images may carry out incidence to an observer with a comparatively big field angle difference, in view of a distant place, the distance of two images is recognized clearly and the three dimensional display effectiveness improves.

[0010] Moreover, since the half mirror side is arranged caudad, in view of the observer side, and the indoor light source does not reflect in a half mirror, display grace can be raised.

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## EXAMPLE

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[Example] Below, this invention is explained based on the example shown in drawing 1 thru/or drawing 4. The liquid crystal display of this invention consists of the light source (4) of the 1st [ which has been arranged at the abbreviation right angle centering on a half mirror (1) and this half mirror (1) ], and 2nd liquid crystal display panels (2), (3), and the 1st and 2nd liquid crystal display panels (2) and (3), (5), and a mirror (6) and (7) like drawing 1.

[0012] The 1st and 2nd liquid crystal display panels (2) and (3) are the things of the configuration of the common knowledge which has arranged the common electrode substrate and segment electrode substrate which formed the common electrode and the segment electrode by ITO etc. at intervals of 10 micrometers of abbreviation so that each electrode may counter, and was filled up with liquid crystal in this substrate gap. By the way, while a half mirror (1) is arranged so that the mirror side may see from an observer and may serve as a lower part, the 2nd liquid crystal display panel (3) which displays a virtual image on the lower part side of the half mirror (1) side is arranged. And the 1st liquid crystal display panel (2) is arranged in the inner part of the half mirror (1).

[0013] The image to display as shown in drawing 2 is patternized, and the 1st liquid crystal display panel (2) carries out the selection transparency of the light of the light source (4), and displays the image (for example, 8 character segments) of drawing 2. This image is looked at by the observer as a real image in the case of a three dimensional display. And as for the panel flat surface of this 1st liquid crystal display panel (2), only theta 1 inclines to the shaft L of drawing. For this reason, the image of the 1st liquid crystal display panel (2) is transmitted leftward [ drawing ] with an optical axis L1 through a half mirror (1), and carries out incidence to an observer's eyes in the viewing angle theta 1.

[0014] On the other hand, the image to display as shown in drawing 3 is patternized, and the 2nd liquid crystal display panel (3) carries out the selection transparency of the light of the light source (5), and displays the image of drawing 3. And as for the panel flat surface of this 2nd liquid crystal display panel (3), only theta 2 inclines to the shaft L of drawing. For this reason, it reflects by the half mirror (1), and the 2nd liquid crystal display panel (3) is transmitted leftward [ drawing ] with an optical axis L2, and carries out incidence of the image to an observer's eyes in the viewing angle theta 2. This image overlaps the real image mentioned above as a virtual image of a three dimensional display, and a desired three dimensional display is performed.

[0015] Moreover, from the distance from the 1st liquid crystal display panel (2) to a half mirror (1), only I is set up short and, as for the distance from this 2nd liquid crystal display panel (3) to a half mirror (1), the image (namely, virtual image) of the 2nd liquid crystal display panel (3) is observed by the observer near the A point ahead of [ I ] the 1st liquid crystal display panel (2). In addition, it is [ the 1st and 2nd liquid crystal display panels (2) and (3) ] usable also to display panels, such as a dot-matrix method. Here, the example using the liquid crystal display panel in which the segment electrode of an INTADIJITARU configuration was formed was explained.

[0016] In order to carry out incidence to an observer's eyes theta1-theta2 in the location before and behind that regardless of the image (virtual image) of the 2nd liquid crystal display panel (3) in an A point, and the image (real image) of the 1st liquid crystal display panel (2) in the liquid crystal display of

above-mentioned this invention by which a configuration is carried out, Since the distance to a half mirror (1) was changed, respectively from the 1st liquid crystal display panel (2) and the 2nd liquid crystal display panel (3) while each image distinguished and was recognized, Depth perception strong against the image (real image) of the 1st liquid crystal display panel (2) and the image (virtual image) of the 2nd liquid crystal display panel (3) will be given, and as shown in drawing 4 , it will be displayed in three dimensions.

[0017] Moreover, since an indoor fluorescence LGT does not reflect in a half mirror (1) even if it performs a three dimensional display, since it has been arranged so that a half mirror (1) side may see from an observer and may serve as a lower part, and the 2nd liquid crystal display panel (3) is arranged to the lower part side, three dimensional display grace can be raised. Although the example mentioned above explained the example which makes the both sides of the 1st liquid crystal display panel (2) and the 2nd liquid crystal display panel (3) incline, by this invention, by making one of liquid crystal display panels incline does not need to explain that the desired end can be attained.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the schematic diagram showing the example of this invention.

[Drawing 2] Drawing showing the example of a display of the 1st liquid crystal display panel.

[Drawing 3] Drawing showing the example of a display of the 2nd liquid crystal display panel.

[Drawing 4] It is drawing showing the three dimensional display of this invention.

[Drawing 5] It is the schematic diagram showing the conventional liquid crystal display.

[Description of Notations]

- (1) Half mirror
- (2) The 1st liquid crystal display panel
- (3) The 2nd liquid crystal display panel
- (4) (5) Light source
- (6) (7) Mirror

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[Translation done.]

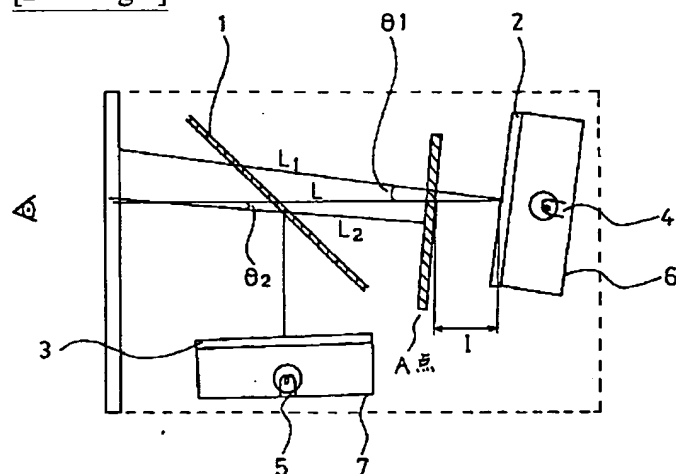
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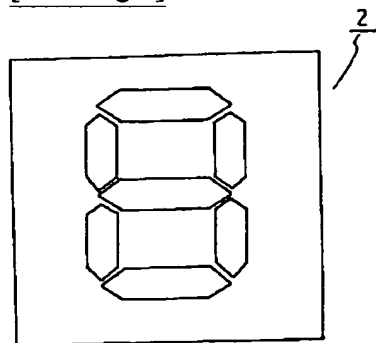
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## DRAWINGS

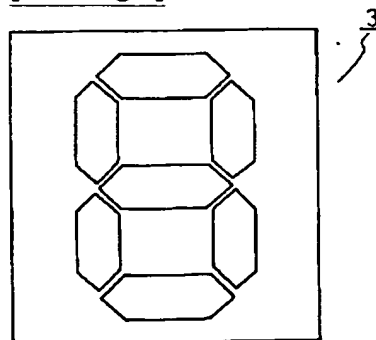
[Drawing 1]



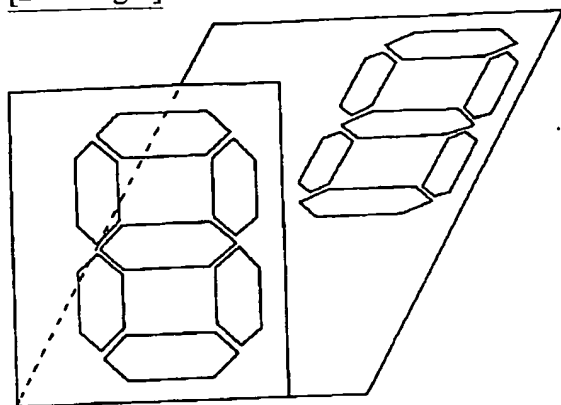
[Drawing 2]



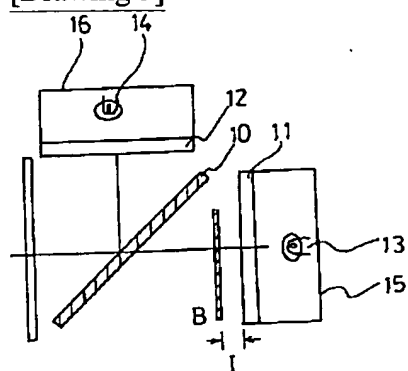
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Translation done.]